

Estimating the Numbers of North American Birds

A series of studies coordinated by the Partners in Flight Science Committee

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Introduction

Estimating population size of North American birds has become a high priority for Partners in Flight and other bird conservation organizations. Knowledge of population size helps us set numerical conservation targets at the local, regional, and continental level. Such estimates are useful in mitigation work, as well as designing and evaluating major conservation programs. Population sizes – both current and target numbers – also resonate well with Congress and other political groups as they decide what resources to allocate for research, conservation, and management programs.

Ken Rosenberg, of the Cornell Laboratory of Ornithology, and Pete Blancher, of the Canadian Wildlife Service, recently published an explanation of ways to estimate population size using Breeding Bird Survey (BBS) data. In describing their method, Rosenberg and Blancher emphasized that they were producing initial estimates and that substantial improvements could probably be made in the estimates by gathering additional information through an extensive, volunteer-based program. The PIF Science Committee has discussed the best ways to improve the population estimates and has decided to initiate a series of studies. An effort, by Robert Altman of the American Bird Conservancy, is already underway to collect information from prior surveys that included records of how birds were detected: by sight, by sound, or by both methods. Existing studies, however, do not cover all species or all areas. Furthermore, collecting this sort of information is simple and well-suited to a citizen science project. We are therefore initiating two studies to improve our estimates of population size for North American.

The first study will involve gathering information on how birds are detected on BBS surveys. It is called the Detection Method Study. A second study will help us determine the probability that birds vocalize while BBS surveyors are present. It is called the Cue Production Study and will involve repeated surveys of a small number of known individuals located in easy-to-survey areas. Dr. Jonathan Bart, of the US Geological Survey, is coordinating these studies. Ms. Ann Manning, of the Great Basin Bird Observatory, will be assisting, especially with data management. Please drop us a line at iwbirds@gmail.com if you are interested in participating in any of these studies. Tell us the State and County (or Counties) you will be working in, which

survey(s) you will participate in, and how many routes (Detection Method) or locations (Cue Production) you may be able to survey. That will help us determine where the gaps in coverage are. Detailed instructions are provided below for the Detection Method Study and Cue Production Study. Field forms, instructions for completing them, and Excel spreadsheets to enter your data can be downloaded separately from the Coordinated Bird Monitoring web site (<http://greatbasin.nbii.gov/cbm/>).

Instructions for conducting the studies

Both studies should be conducted when the BBS is conducted. The BBS web page describes this time as follows:

In most states, routes should be run in early or mid-June. In Canada and most bordering states, any day throughout June and including the very first few days of July are acceptable. In the desert regions of California, Nevada, Arizona, New Mexico, Texas, Utah, and south Florida, routes may be run as early as May, at the discretion of the State Coordinators.

For the Detection Method Study, conduct 3-minute point counts with stations at half mile intervals along roads, as in a normal BBS, except that the survey can be done along any road; it does not have to be a real BBS route. Ideally, do 50 stations starting half an hour before sunrise, as in a normal BBS route, but if that is not convenient then do at least 10 stations at a time and try to distribute the surveys evenly throughout the times of day, and dates, when BBS surveys are run in your area (however, do not do this survey at the same time as you do a regular BBS route). Detailed instructions for conducting the survey are available in the document Instructions for Completing the Detection Methods Form – 2006. In brief, at each station you record the cues you used to detect each individual bird: song, note, and sighting. Also record fly-bys, defined as birds clearly moving long distances and not associated with the area around the survey station, and birds that approach you and would probably not have been recorded otherwise. For sexually dimorphic species that are detected by sight, try to determine the sex. If possible, use a GPS unit and record the location of each station.

For the Cue Production Study, select a location that is convenient to survey and conduct several 30-minute surveys during which you make detailed observations on the vocalizations given by a small number of birds. Detailed instructions for conducting the survey are available in the document Instructions for Completing the Cue Production– 2006. In brief, record the presence of song – or if there is no song, of notes, in each 15 second interval for each bird. This survey is easiest if you survey a small, discrete patch of habitat so that few conspecific neighbors are present. Linear habitats are next best, because the number of neighbors is reduced. Continuous habitat can also be surveyed but more time may be required getting to know the birds so you know which individual is singing. The key requirement in this study is recording all vocalizations for each of the focal individuals. A list of preferred species is included in the Appendix. Distribute the survey periods evenly throughout the days, and times of days, when BBS routes are run. You may find that birds move into your patch after your surveys have begun and that birds you started with fall silent. Continue to monitor the initial species and add additional individuals if you feel you can keep accurate records of their vocalizations. At the end

of the survey, summarize information about evidence of nesting for each of your focal individuals (see Cue Production Study – 2006 – Evidence of Breeding Form).

Excel spreadsheets (for use with Windows operating systems) are provided for each Survey at <http://greatbasin.nbii.gov/cbm/> to help you transfer data from your field form to us. We prefer that you enter your data on this form and e-mail it to iwbirds@gmail.com. If this is not feasible, then please mail your survey forms to:

Ann Manning
Snake River field Station, USGS
970 Lusk Street
Boise, Idaho 83706

Please submit your data frequently so we have an idea of how many surveys are being completed and can check for any mis-understandings about how data are to be collected or entered.

Rationale for estimating population size from the BBS

This section explains how we will use information from the Detection Methods and Cue Production studies to improve estimates of population size for North American birds. You do not need to understand these details to participate in either Study.

The Rosenberg-Blancher estimates are derived from the BBS by calculating the mean birds recorded per BBS route, estimating the areas covered on these surveys, and adding multipliers to account for detection rates. A slightly more general version of the equation they used is

$$\text{Population size} = \text{Area} \times \text{Density} \quad (1)$$

and

$$\text{Density} = \frac{\left(\begin{array}{c} \text{Ave. per} \\ \text{BBS rte} \end{array} \right)}{\left(\begin{array}{c} \text{Effective} \\ \text{Area} \end{array} \right) \left(\begin{array}{c} \text{Detection} \\ \text{Ratio} \end{array} \right) \left(\begin{array}{c} \text{Roadside} \\ \text{Correction} \\ \text{Factor} \end{array} \right)} \quad (2)$$

In practice, some of the terms above are estimated for specific areas and used to estimate population size in each area. Estimates from different areas are then summed to estimate population size at larger scales. The terms in expression (2) are explained below.

Ave. per BBS rte – the average number of birds recorded per BBS route during a defined period within a defined area.

Effective Area – the area “covered” by the BBS. We define the effective area for a given location and surveyor as the smallest area that includes all birds the surveyor could detect (the number actually detected may be smaller). We refer to birds within the Effective Area as “focal

birds". The effective area for a series of surveys is the sum of the location-specific areas. One way to estimate the effective area is to estimate the "average maximum distance", r say, at which birds are recorded and estimate the effective area at each BBS station as πr^2 . The Effective Area covered on one BBS route is thus $50\pi r^2$.

Detection ratio – The detection ratio is an estimate of the ratio (mean number of birds recorded by the BBS surveyor)/(mean number of birds present within the Effective Areas at the start of the surveys). This term corrects for birds missed and for birds that were not present in the Effective Area at the start of the survey, but entered it after the survey began and were recorded (the possibility of over-counts is why we call it a Detection Ratio, not Detection Rate which would imply a number ≤ 1.0). Several methods have been considered for estimating the Detection Rate. Rosenberg and Blancher studied how numbers recorded varied with time of day. They developed a species-specific multiplier to convert mean number recorded to an estimate of the mean number recorded at the peak time of day (Time of Day multiplier). They assumed that at this time an average of one member per pair within the Effective Area is detected so their estimate of the Detection Ratio was 2 times the Mn/BBS route times the Time of Day multiplier. They call the "2" a Pair Correction Factor because it converted the estimate of pairs to an estimate of all birds present.

Another approach is to express the Detection Ratio (DR) as

$$DR = \frac{\sum_i n_i}{\sum_i N_i} = \frac{\bar{n}}{\bar{N}} = \frac{P_s P_{d|s}}{2 P_s P_{sa}} \quad (3)$$

where n_i = number recorded at the i^{th} location, N_i = number present in the effective area at the i^{th} location, and

$$P_s = \frac{M_s}{M} \quad P_{d|s} = \frac{m_{sa}}{M_s} \quad p_s = \frac{m_s}{n} \quad P_{sa} = \frac{m_{sa}}{m_s}$$

where M_s = the number of focal males that sing at least once during a 3-minute interval, M is the total number of focal males present, m_{sa} = the number of focal males recorded singing, and m_s is the total number of singing males recorded. In this approach, we assume that "song" is defined in a manner such that only males sing and that the sex ratio is 1:1. The P -terms have the following interpretations:

- P_s = the "singing rate" i.e., the proportion of the males, within the Effective Areas, that sing at least once while the surveyor is present
- $P_{d|s}$ = the "detection rate", the proportion of birds that do sing that are detected by song
- p_s = the proportion of birds detected that are detected by song
- P_{sa} = the ratio "birds detected by song in the Effective Area"/"all bird detected by song"

Substituting the definitions of P_s , $P_{d|s}$, p_s and P_{sa} into the right side of expression (3) yields

$$DR = \frac{\frac{M_s}{n} \frac{m_{sa}}{m_s}}{\frac{M}{2} \frac{M_s}{m_s}} = \frac{n}{2M} = \frac{n}{N}$$

the last step following because we assume an equal sex ratio. Thus, expression (3) just provides a way of expressing the DR . The terms in expression (3), however, can be estimated through independent studies, such as the ones described in this document, and the results can then be applied, using expression (3), to obtain the DR for BBS. Past and ongoing studies by researchers provide a way to estimate P_{dis} . The studies described in this document will let us estimate P_s and p_s . Other field work is underway to estimate the Effective Area and to estimate P_{sa} . Taken together, the results will thus let us estimate DR .

The method above uses the average numbers recorded for n_i . It was noted, however, that in earlier work, a “time of day” correction was applied to estimate the number that would have been recorded at the best time of day for the survey. This approach can be extended to include other modifiers, for example date and a measure of surveyor skill, and the equations to carry out these modifications could depend on region, habitat, and other variables. We would thus replace n_i with n_i^* say, the number predicted to have been recorded under optimal conditions. This number might be expressed as $f(n_i, \mathbf{X})$, where \mathbf{X} represents a vector of factors such as time of day, date, and location. The equation for n_i^* would be

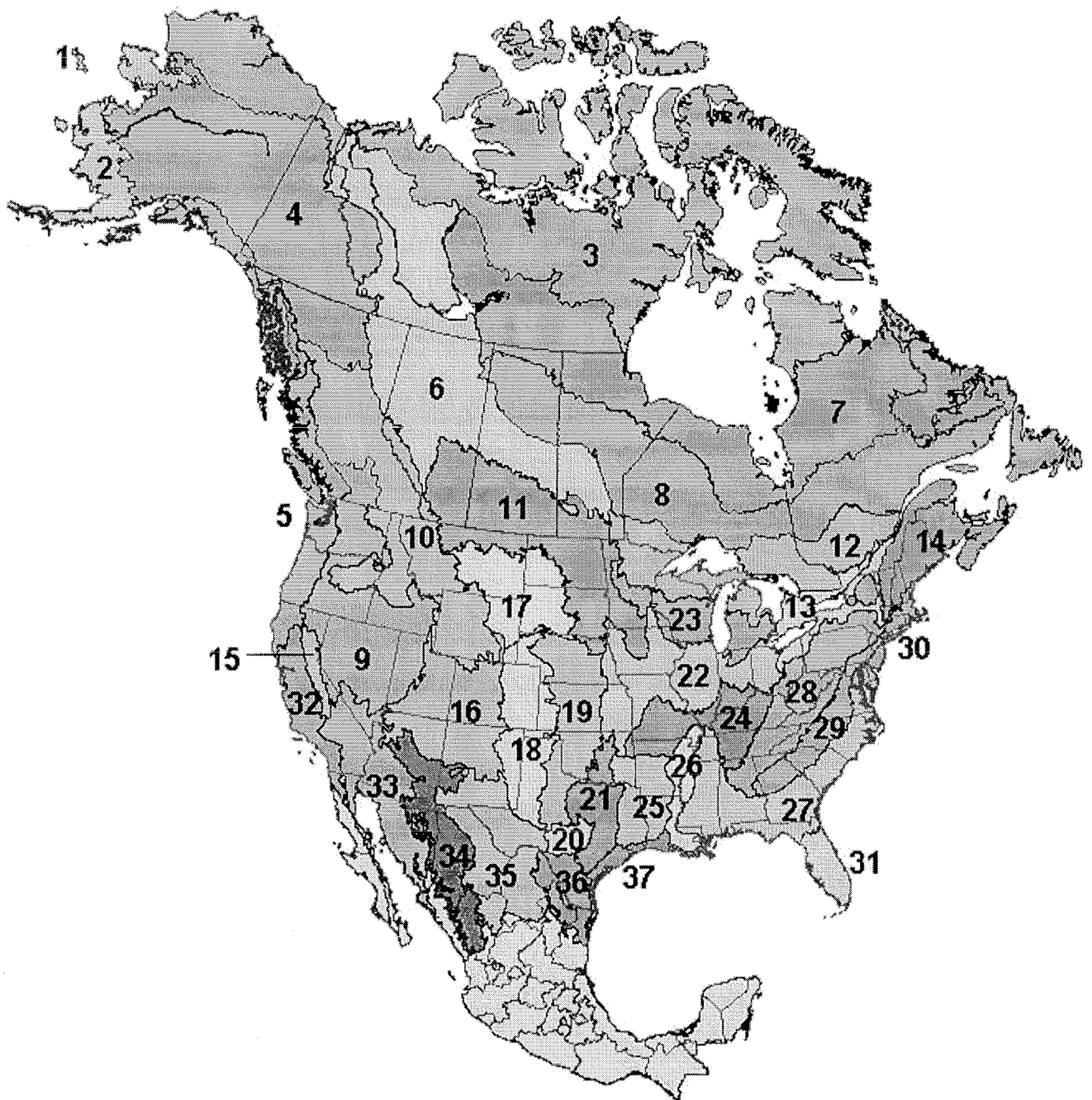
$$n_i^* = \left(\frac{\max[f(n_i, \mathbf{X})]}{f(n_i, \mathbf{X})} \right) n_i$$

For example, if $f(n_i, \mathbf{X})$ was 60% of the maximum value predicted for that location, then n_i would be multiplied by $1/0.6 = 1.67$ to obtain n_i^* . In this approach, all of the P -terms would be estimated for optimal conditions. This may be easier than estimating them for all possible or “average” conditions. More work will be needed, however, to decide whether to estimate DR using n_i or n_i^* .

Roadside Correction Factor – the density of birds along roads may not be equal to regionwide density. If this is true, estimates from the BBS could yield estimates of regionwide density and population size that are biased. The Roadside Correction Factor is intended to remove any such bias. It is defined as the ratio (regionwide density)/(density along roads). It can be estimated by using regionwide GIS layers depicting habitat and other variables correlated with bird abundance and then developing models to predict density based on these variables. The models can then be applied to a large sample of points, evenly distributed throughout the region, to estimate regionwide density. Such a study is planned for late summer 2006. Field work may be initiated in 2007 to evaluate results from this study.

Appendix: Priority species for the Cue Production Study

This Appendix lists preferred species for the Cue Production Study. Find the BCR you will be collecting data in, and then look at the suggested species for your BCR in the list following the map. While these are optimal species, all data will be useful. If these species are not readily accessible to you, record information on whichever species are most accessible.



BCR Common_Name	8 Connecticut Warbler
1 McKay's Bunting	8 Mourning Warbler
2 American Tree Sparrow	8 Nashville Warbler
2 Blackpoll Warbler	8 Olive-sided Flycatcher
2 Golden-crowned Sparrow	8 Ovenbird
2 Varied Thrush	8 Philadelphia Vireo
3 Harris's Sparrow	8 Purple Finch
3 Smith's Longspur	8 Ruby-crowned Kinglet
4 Blackpoll Warbler	8 Swamp Sparrow
4 Boreal Chickadee	8 Winter Wren
4 Olive-sided Flycatcher	8 Yellow-bellied Flycatcher
4 White-crowned Sparrow	9 Brewer's Sparrow
4 Wilson's Warbler	9 Cassin's Finch
5 Black-throated Gray Warbler	9 Dusky Flycatcher
5 Cassin's Vireo	9 Gray Flycatcher
5 Chestnut-backed Chickadee	9 Green-tailed Towhee
5 Dusky Flycatcher	9 Lazuli Bunting
5 Golden-crowned Kinglet	9 MacGillivray's Warbler
5 Hermit Warbler	9 Mountain Chickadee
5 Hutton's Vireo	9 Olive-sided Flycatcher
5 MacGillivray's Warbler	9 Purple Finch
5 Olive-sided Flycatcher	9 Rock Wren
5 Orange-crowned Warbler	9 Sage Sparrow
5 Pacific-slope Flycatcher	9 Sage Thrasher
5 Purple Finch	9 Townsend's Warbler
5 Spotted Towhee	9 Willow Flycatcher
5 Townsend's Warbler	10 Brewer's Sparrow
5 Willow Flycatcher	10 Cassin's Finch
6 Alder Flycatcher	10 Cassin's Vireo
6 Clay-colored Sparrow	10 Chestnut-collared Longspur
6 Connecticut Warbler	10 Dusky Flycatcher
6 Le Conte's Sparrow	10 Golden-crowned Kinglet
6 Least Flycatcher	10 Hammond's Flycatcher
6 Nelson's Sharp-tailed Sparrow	10 Lark Bunting
7 Blackpoll Warbler	10 Lazuli Bunting
7 Fox Sparrow	10 McCown's Longspur
7 Fox Sparrow	10 Olive-sided Flycatcher
7 Gray-cheeked Thrush	10 Townsend's Warbler
7 Palm Warbler	10 Willow Flycatcher
7 Swamp Sparrow	11 Baird's Sparrow
8 Alder Flycatcher	11 Chestnut-collared Longspur
8 Bay-breasted Warbler	11 Clay-colored Sparrow
8 Bicknell's Thrush	11 Dickcissel
8 Black-and-white Warbler	11 Grasshopper Sparrow
8 Black-throated Green Warbler	11 Lark Bunting
8 Canada Warbler	11 Le Conte's Sparrow
8 Cape May Warbler	11 McCown's Longspur
8 Chestnut-sided Warbler	11 Nelson's Sharp-tailed Sparrow

11	Sedge Wren	14	Yellow-throated Vireo
11	Sprague's Pipit	15	Brewer's Sparrow
12	Bay-breasted Warbler	15	Cassin's Finch
12	Bicknell's Thrush	15	Golden-crowned Kinglet
12	Blackburnian Warbler	15	Mountain Chickadee
12	Black-throated Blue Warbler	15	Olive-sided Flycatcher
12	Black-throated Green Warbler	15	Purple Finch
12	Canada Warbler	16	Bell's Vireo
12	Chestnut-sided Warbler	16	Bendire's Thrasher
12	Common Yellowthroat	16	Black-throated Gray Warbler
12	Connecticut Warbler	16	Black-throated Sparrow
12	Field Sparrow	16	Brewer's Sparrow
12	Golden-winged Warbler	16	Canyon Wren
12	Henslow's Sparrow	16	Cassin's Finch
12	Kirtland's Warbler	16	Cordilleran Flycatcher
12	Least Flycatcher	16	Grace's Warbler
12	Mourning Warbler	16	Gray Vireo
12	Olive-sided Flycatcher	16	Green-tailed Towhee
12	Purple Finch	16	Juniper Titmouse
12	Sedge Wren	16	Mountain Bluebird
12	Veery	16	Plumbeous Vireo
12	Wood Thrush	16	Pygmy Nuthatch
13	Canada Warbler	16	Rock Wren
13	Cerulean Warbler	16	Sage Sparrow
13	Eastern Kingbird	16	Say's Phoebe
13	Eastern Towhee	16	Virginia's Warbler
13	Eastern Wood-Pewee	16	Warbling Vireo
13	Field Sparrow	16	Willow Flycatcher
13	Golden-winged Warbler	17	Baird's Sparrow
13	Henslow's Sparrow	17	Brewer's Sparrow
13	Savannah Sparrow	17	Chestnut-collared Longspur
13	Wood Thrush	17	Dickcissel
14	American Redstart	17	Grasshopper Sparrow
14	Bay-breasted Warbler	17	Lark Bunting
14	Bicknell's Thrush	17	Le Conte's Sparrow
14	Black-and-white Warbler	17	McCown's Longspur
14	Blackburnian Warbler	17	Mountain Bluebird
14	Blackpoll Warbler	17	Sage Thrasher
14	Black-throated Blue Warbler	17	Say's Phoebe
14	Black-throated Green Warbler	17	Sprague's Pipit
14	Boreal Chickadee	17	Vesper Sparrow
14	Canada Warbler	18	Bell's Vireo
14	Eastern Towhee	18	Brewer's Sparrow
14	Northern Parula	18	Cassin's Sparrow
14	Olive-sided Flycatcher	18	Chestnut-collared Longspur
14	Purple Finch	18	Grasshopper Sparrow
14	Veery	18	Lark Bunting
14	White-throated Sparrow	18	Lark Sparrow
14	Wood Thrush	18	McCown's Longspur

18	Say's Phoebe	22	Kentucky Warbler
18	Yellow Warbler	22	Louisiana Waterthrush
19	Bell's Vireo	22	Prothonotary Warbler
19	Black-capped Vireo	22	Sedge Wren
19	Cassin's Sparrow	22	Wood Thrush
19	Dickcissel	22	Yellow-breasted Chat
19	Eastern Kingbird	23	Acadian Flycatcher
19	Field Sparrow	23	Cerulean Warbler
19	Grasshopper Sparrow	23	Clay-colored Sparrow
19	Henslow's Sparrow	23	Dickcissel
19	Lark Bunting	23	Field Sparrow
19	Painted Bunting	23	Golden-winged Warbler
19	Rufous-crowned Sparrow	23	Grasshopper Sparrow
20	Bell's Vireo	23	Henslow's Sparrow
20	Bewick's Wren	23	Marsh Wren
20	Black-capped Vireo	23	Sedge Wren
20	Black-crested Titmouse	23	Veery
20	Canyon Wren	23	Vesper Sparrow
20	Cassin's Sparrow	23	Warbling Vireo
20	Common Yellowthroat	23	Willow Flycatcher
20	Dickcissel	23	Yellow-throated Vireo
20	Field Sparrow	24	Acadian Flycatcher
20	Golden-cheeked Warbler	24	Bachman's Sparrow
20	Lark Sparrow	24	Bell's Vireo
20	Painted Bunting	24	Bewick's Wren
20	Rufous-crowned Sparrow	24	Blue-gray Gnatcatcher
20	Yellow Warbler	24	Blue-winged Warbler
21	Bell's Vireo	24	Brown-headed Nuthatch
21	Black-capped Vireo	24	Carolina Chickadee
21	Carolina Chickadee	24	Cerulean Warbler
21	Cassin's Sparrow	24	Eastern Kingbird
21	Dickcissel	24	Eastern Towhee
21	Field Sparrow	24	Eastern Wood-Pewee
21	Golden-cheeked Warbler	24	Field Sparrow
21	Great Crested Flycatcher	24	Grasshopper Sparrow
21	Lark Sparrow	24	Henslow's Sparrow
21	Painted Bunting	24	Indigo Bunting
21	Swainson's Warbler	24	Kentucky Warbler
21	Yellow Warbler	24	Lark Sparrow
22	Acadian Flycatcher	24	Louisiana Waterthrush
22	Bell's Vireo	24	Painted Bunting
22	Bewick's Wren	24	Prairie Warbler
22	Cerulean Warbler	24	Sedge Wren
22	Dickcissel	24	Swainson's Warbler
22	Eastern Kingbird	24	Tufted Titmouse
22	Field Sparrow	24	White-eyed Vireo
22	Grasshopper Sparrow	24	Wood Thrush
22	Great Crested Flycatcher	24	Worm-eating Warbler
22	Henslow's Sparrow	24	Yellow-breasted Chat

24	Yellow-throated Vireo	27	Field Sparrow
24	Yellow-throated Warbler	27	Henslow's Sparrow
25	Acadian Flycatcher	27	Hooded Warbler
25	Bachman's Sparrow	27	Indigo Bunting
25	Bachman's Warbler	27	Northern Parula
25	Bell's Vireo	27	Painted Bunting
25	Bewick's Wren	27	Pine Warbler
25	Black-and-white Warbler	27	Prairie Warbler
25	Brown-headed Nuthatch	27	Prothonotary Warbler
25	Carolina Chickadee	27	Seaside Sparrow
25	Cerulean Warbler	27	Swainson's Warbler
25	Dickcissel	27	White-eyed Vireo
25	Eastern Wood-Pewee	27	Wood Thrush
25	Field Sparrow	27	Yellow-throated Vireo
25	Hooded Warbler	28	Acadian Flycatcher
25	Kentucky Warbler	28	Bachman's Sparrow
25	Louisiana Waterthrush	28	Bewick's Wren
25	Painted Bunting	28	Black-and-white Warbler
25	Pine Warbler	28	Blackburnian Warbler
25	Prairie Warbler	28	Blue-winged Warbler
25	Prothonotary Warbler	28	Carolina Chickadee
25	Swainson's Warbler	28	Cerulean Warbler
25	Tufted Titmouse	28	Eastern Towhee
25	White-eyed Vireo	28	Eastern Wood-Pewee
25	Wood Thrush	28	Field Sparrow
25	Yellow-throated Vireo	28	Golden-winged Warbler
26	Bachman's Warbler	28	Grasshopper Sparrow
26	Cerulean Warbler	28	Henslow's Sparrow
26	Dickcissel	28	Hooded Warbler
26	Eastern Kingbird	28	Indigo Bunting
26	Eastern Wood-Pewee	28	Kentucky Warbler
26	Northern Parula	28	Lark Sparrow
26	Painted Bunting	28	Louisiana Waterthrush
26	Prothonotary Warbler	28	Olive-sided Flycatcher
26	Swainson's Warbler	28	Prairie Warbler
26	White-eyed Vireo	28	Wood Thrush
26	Wood Thrush	28	Worm-eating Warbler
26	Yellow-breasted Chat	28	Yellow-breasted Chat
27	Acadian Flycatcher	28	Yellow-throated Vireo
27	Bachman's Sparrow	28	Yellow-throated Warbler
27	Bachman's Warbler	29	Bachman's Sparrow
27	Bewick's Wren	29	Bewick's Wren
27	Black-throated Green Warbler	29	Blue-winged Warbler
27	Brown-headed Nuthatch	29	Brown-headed Nuthatch
27	Carolina Chickadee	29	Carolina Chickadee
27	Cerulean Warbler	29	Cerulean Warbler
27	Eastern Kingbird	29	Eastern Kingbird
27	Eastern Towhee	29	Eastern Towhee
27	Eastern Wood-Pewee	29	Eastern Wood-Pewee

29	Field Sparrow	32	Hermit Warbler
29	Grasshopper Sparrow	32	Hutton's Vireo
29	Henslow's Sparrow	32	Island Scrub-Jay
29	Pine Warbler	32	Lawrence's Goldfinch
29	Prairie Warbler	32	Lazuli Bunting
29	Sedge Wren	32	Lesser Goldfinch
29	Swainson's Warbler	32	Marsh Wren
29	Wood Thrush	32	Oak Titmouse
29	Yellow-throated Vireo	32	Olive-sided Flycatcher
30	Black-and-white Warbler	32	Purple Finch
30	Blue-winged Warbler	32	Spotted Towhee
30	Brown-headed Nuthatch	32	Wrentit
30	Eastern Kingbird	33	Abert's Towhee
30	Eastern Towhee	33	Bell's Vireo
30	Eastern Wood-Pewee	33	Bendire's Thrasher
30	Field Sparrow	33	Black-tailed Gnatcatcher
30	Golden-winged Warbler	33	Black-throated Sparrow
30	Grasshopper Sparrow	33	Cactus Wren
30	Henslow's Sparrow	33	Crissal Thrasher
30	Hooded Warbler	33	Curve-billed Thrasher
30	Kentucky Warbler	33	Gray Vireo
30	Marsh Wren	33	Le Conte's Thrasher
30	Prairie Warbler	33	Lucy's Warbler
30	Purple Finch	33	Phainopepla
30	Saltmarsh Sharp-tailed Sparrow	33	Rock Wren
30	Sedge Wren	33	Rufous-winged Sparrow
30	Veery	33	Say's Phoebe
30	Wood Thrush	33	Verdin
31	Bachman's Sparrow	34	Ash-throated Flycatcher
31	Black-whiskered Vireo	34	Bell's Vireo
31	Brown-headed Nuthatch	34	Black-chinned Sparrow
31	Eastern Towhee	34	Black-throated Gray Warbler
31	Grasshopper Sparrow	34	Black-throated Sparrow
31	Gray Kingbird	34	Bridled Titmouse
31	Prairie Warbler	34	Cactus Wren
31	Prothonotary Warbler	34	Canyon Towhee
31	Seaside Sparrow	34	Canyon Wren
31	White-breasted Nuthatch	34	Cassin's Kingbird
31	White-eyed Vireo	34	Cassin's Sparrow
31	Yellow-throated Warbler	34	Cordilleran Flycatcher
32	Ash-throated Flycatcher	34	Crissal Thrasher
32	Bewick's Wren	34	Five-striped Sparrow
32	Black Phoebe	34	Grace's Warbler
32	Black-chinned Sparrow	34	Gray Vireo
32	Bushtit	34	Hooded Oriole
32	California Gnatcatcher	34	Juniper Titmouse
32	California Thrasher	34	Lucy's Warbler
32	California Towhee	34	Mexican Chickadee
32	Cassin's Vireo	34	Mexican Jay

34 Northern Beardless-Tyrannulet	36 Verdin
34 Olive Warbler	36 White-collared Seedeater
34 Painted Redstart	36 Yellow-green Vireo
34 Phainopepla	37 Acadian Flycatcher
34 Plumbeous Vireo	37 Bell's Vireo
34 Pygmy Nuthatch	37 Bewick's Wren
34 Red-faced Warbler	37 Botteri's Sparrow
34 Rufous-crowned Sparrow	37 Dickcissel
34 Rufous-winged Sparrow	37 Henslow's Sparrow
34 Spotted Towhee	37 Kentucky Warbler
34 Virginia's Warbler	37 Northern Beardless-Tyrannulet
34 Yellow-eyed Junco	37 Painted Bunting
35 Bell's Vireo	37 Prothonotary Warbler
35 Black-capped Vireo	37 Seaside Sparrow
35 Black-tailed Gnatcatcher	37 Swainson's Warbler
35 Black-throated Sparrow	37 Yellow-green Vireo
35 Cactus Wren	37 Yellow-throated Vireo
35 Canyon Towhee	37 Yellow-throated Warbler
35 Canyon Wren	
35 Cassin's Kingbird	
35 Cassin's Sparrow	
35 Colima Warbler	
35 Crissal Thrasher	
35 Lucy's Warbler	
35 Painted Bunting	
35 Pyrrhuloxia	
35 Rufous-crowned Sparrow	
35 Say's Phoebe	
35 Varied Bunting	
35 Verdin	
35 Willow Flycatcher	
35 Yellow Warbler	
36 Bell's Vireo	
36 Botteri's Sparrow	
36 Cactus Wren	
36 Cassin's Sparrow	
36 Common Yellowthroat	
36 Couch's Kingbird	
36 Curve-billed Thrasher	
36 Dickcissel	
36 Hooded Oriole	
36 Lark Sparrow	
36 Northern Beardless-Tyrannulet	
36 Olive Sparrow	
36 Painted Bunting	
36 Pyrrhuloxia	
36 Rose-throated Becard	
36 Tropical Parula	
36 Varied Bunting	